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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/755,429	01/12/2004	Robert S. Nemiroff	BCS03181	9697

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EXAMINER	
WERNER, DAVID N	

ART UNIT	PAPER NUMBER
2621	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Docketing.US@motorola.com

Office Action Summary	Application No.	Applicant(s)	
	10/755,429	NEMIROFF ET AL.	
	Examiner	Art Unit	
	David N. Werner	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,13-22 and 26-28* is/are rejected.

7)☒ Claim(s) *9-12 and 23-25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office action for U.S. Patent Application 10/755,429 is responsive to communications filed 12 December 2008, in reply to the Non-Final Rejection of 11 September 2008. Currently, claims 1–28 are pending.

2. In the previous Office action, claim 28 was rejected under 35 U.S.C. 101 as non-statutory. Claims 1–28 were rejected under 35 U.S.C. 103(a) as obvious over U.S. Patent Application Publication 2002/0106022 A1 (Satoh et al.), and in view of U.S. Patent 7,079,581 B2 (Noh et al.).

Response to Arguments

3. Applicant's arguments filed with respect to the rejection of claim 28 under 35 U.S.C. 101 have been fully considered but they are not persuasive. Applicant states that since claim 28 is directed to a "computer-readable storage medium" described in paragraph 0050 of the specification as incorporating statutory embodiments including a non-writable storage medium or a writable storage media. However, although the specification describes these tangible embodiments, paragraph 0050 of the specification also states that the claimed computer-readable storage medium incorporates "information conveyed to a computer by a communications medium, such as through a computer or telephone network including wireless communications" and "specifically includes information downloaded from the Internet and other networks". Since the claimed storage medium incorporates both the statutory non-writable or

writable storage media as well as the non-statutory communications medium, the claim is non-patentable even though it is presented in proper *Beauregard* format. A broad recitation of a medium in the preamble of a claim is not necessarily required to be embodied in a tangible computer-readable medium. *Ex parte Isaacson*, BPAI 26 February 2009 (claimed medium in *Beauregard* format described in specification to encompass a wireless network held non-statutory).

4. Applicant's arguments filed with respect to the rejection of the independent claims have been fully considered but they are not persuasive. Applicant makes three arguments: first, that the parameter r in Noh is not the claimed "adjustment factor", second, that the average bit count in Haskell is not the claimed "average spatial activity value", and third, that the references do not recite the claimed "normalized spatial activity value" which depends on "a function of said adjustment factor".

Regarding the statement that parameter r in Noh is not "a ratio of a number of bits representing a selected frame defined by said bitstream to a target number of bits for said selected frame", it is respectfully submitted that a ratio of actual bit rate to target bit rate is mathematically equivalent to a ratio of actual bit count to target bit count. Let r in Noh et al. be defined as $\frac{bits(ACTUAL)/time}{bits(TARGET)/time}$, where time is the time needed to produce a frame. Then, this can be simplified by cancelling out time in the numerator and denominator of the above ratio, and reducing to a ratio of bit count as

$\frac{bits(ACTUAL)}{bits(TARGET)} * \frac{1/time}{1/time} = \frac{bits(ACTUAL)}{bits(TARGET)} * 1 = \frac{bits(ACTUAL)}{bits(TARGET)}$. Therefore, it is respectfully submitted that Noh et al. discloses the claimed ratio.

Regarding the statement that the average number of bits per frame is not "an average spatial activity value", it is respectfully submitted that according to basic information theory principles, a more complex data set must inherently be encoded with a greater number of bits in an entropy coding. In Haskell et al., the calculation of the average number of bits per frame is performed at rate control 113 (column 8: line 60–column 9: line 14), which receives as input a status signal 112 from transmission buffer 111 (column 5: lines 12–16), which stores H.261-encoded video from encoder 109 (column 4: lines 60–62). Since H.261 includes variable-length entropy coding, it must be subject to the limitations of complexity, or data entropy, on bit rate or bit count. See for example Shannon C.E., "A Mathematical Theory of Communication". Therefore, it is respectfully submitted that the average frame bit count of Haskell et al. inherently is an average frame spatial activity value.

Regarding the statement that the multiplication factor in Satoh is not the claimed function of an adjustment factor, it is respectfully submitted that while in Satoh, the multiplication factor in the normalization formula is a constant, claim 1 itself does not say that the adjustment factor function is non-constant, and so whenever the adjustment factor function in claim 1 has a value of 2, the formula in claim 9 is identical to the formula given in Satoh et al. Claim 9, which recites a non-constant function of the adjustment factor, is considered novel over Satoh.

Considering the above, the rejection of the independent claims over the prior art is maintained. Claims 9–12 and 23–25 are determined to contain patentable subject matter.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 28 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The relevant portions of the USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (O.G. Notice of 22 November 2005), Annex IV, read as follows:

> Claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. *O'Reilly*, 56 U.S. (15 How.) at 112-14. Moreover, it does not appear that a claim reciting a signal encoded with functional descriptive material falls within any of the categories of patentable subject matter set forth in Sec. 101.
>
> On the other hand, from a technological standpoint, a signal encoded with functional descriptive material is similar to a computer-readable memory encoded with functional descriptive material, in that they both create a functional interrelationship with a computer. In other words, a computer is able to execute the encoded functions, regardless of whether the format is a disk or a signal.
>
> These interim guidelines propose that such signal claims are ineligible for patent protection because they do not fall within any of the four statutory classes of Sec. 101.

Claim 28 specifies a "computer readable storage medium encoding program instructions". Normally, this claim would be statutory. However, since the phrase "computer readable storage medium" is not explicitly defined in the specification, the

ordinary use of the phrase must be used, here, encompassing statutory media such as "non-writable storage media" and "writable storage media" as well as *non-statutory* matter such as "information conveyed to a computer by a communications medium", "information downloaded from the Internet", and "signal-bearing media".

A signal embodying functional descriptive material is neither a process nor a product (i.e., a tangible "thing") and therefore does not fall within one of the four statutory classes of §101. Rather, a signal is a form of energy, in the absence of any physical structure or tangible material. *In re Nuijten*, 84 USPQ2d 1495, 85 USPQ2d 1927 (Fed. Cir. 2007).

Because the full scope of the claimed computer-readable medium as properly read in light of the disclosure encompasses non-statutory subject matter, the claim as a whole is non-statutory. *Ex parte Uceda-Sosa*, BPAI 18 November 2008; *Ex parte Arhens*, BPAI 19 November 2008; *Ex parte Wies*, BPAI 28 November 2008; *Ex Parte Brubacher*, BPAI 22 January 2009; *Ex parte Hartel*, BPAI 29 January 2009; *Ex parte Isaacson*, BPAI 26 February 2009 (all directed to *Beauregard* claims held non-statutory wherein the specification discloses that a claimed computer-readable medium encompasses transitory signals).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

> invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1–8, 13–22, and 26–28 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,687,095 A (Haskell et al.) in view of U.S. Patent 7,079,582 B2 (Noh et al.) and U.S. Patent Application Publication 2002/0106022 A1 (Satoh et al.).

Haskell et al. teaches a system for converting a video transmission bit rate. Regarding step (a) of claim 1 and claim 13, Haskell et al. determines the target number of bits per macroblock to be output based on a desired output rate signal and a buffer status signal (column 5: lines 28-31). The buffer status signal is the occupancy rate of a transmission buffer that outputs re-encoded compressed video data at a constant bit rate, and so is a measure of the number of actual bits per frame (column 5: lines 4-12). Regarding step (b) of claim 1 and claim 13, Haskell et al. calculates the average number of bits per frame (column 9: lines 8-14). Regarding steps (c) and (d) of claim 1 and claim 13, Haskell et al. calculates a target number of bits per frame and per macroblock based on a constant, the target video output rate, the maximum frame rate, and the total number of macroblocks in the frame. The target macroblock rate corresponds with the activity value for the "sets", and the target frame rate corresponds with the activity of the "set of sets", as well as the target number of bits for a frame in step (a). However, Haskell et al. does not teach determining an adjustment factor as the ratio between an actual number of bits in a frame and a target number of bits, as required in step (a) of claim 1 and claim 13, nor does it teach normalizing the spatial activity value, as required in step (d) of claim 1 and claim 13.

Noh et al. teaches a variable bit rate control system for a digital video encoder. Regarding step (a) of claims 1 and 13, Noh et al. calculates a parameter r as a deviation between a "production rate" and a "target bit rate". More precisely, "r is defined as a value that is obtained by dividing the actual production rate of bit by the target bit rate. For instance, if the target bit rate is 1 and the parameter r is larger than 1, it is understood that many bits are produced, whereas if the target bit rate is 1 and the parameter r is smaller than 1, little bits are produced" (column 8: lines 19-30). Parameter r is then used to determine an acceptable variation from a target bit rate within a safe range to prevent buffer overflow or underflow and adjust a quantization parameter (column 8: lines 31-60). Then, parameter r of Noh et al. corresponds with the claimed adjustment factor.

Haskell et al. discloses a majority of the claimed invention except for producing a quantization adjustment factor as a ratio of an actual bit rate to a target bit rate. Noh et al. teaches that it was known to produce a parameter which is the ratio of a production bit rate and a target bit rate. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to use this ratio as an adjustment factor, since Noh et al. states in column 8: line 54–column 9: line 8 that such a modification would allow an image quality to be kept high within a variable-bit-rate encoding system while still regulating encoder buffer flow.

However, the presently claimed invention encompasses specific calculations for the spatial activity value in response to specific data in the video, as shown in claims 6-8,

and the calculation of a normalized spatial activity value, for example, in claims 1d and 9. However, Haskell et al. and Noh et al. do not show these limitations.

Satoh et al. teaches a transcoder for converting from MPEG-2 video to MPEG-4 video. Regarding claims 1d and 13d, equation 22 of Satoh gives a normalized activity calculation identical to that presently claimed, except f(rcFactor) is set to 2. However, it is respectfully submitted that when parameter r of Noh et al. is 2, that is, when an actual number of bits in a frame is twice the target number of bits, as described in the calculation of f(rcFactor) in claims 10 and 24, the normalized spatial activity value calculation of claims 1d and 13d, as shown in claims 9 and 23, reduces to equation 22 of Satoh et al. Applicant is reminded that a prior art species anticipates a claimed genus (MPEP 2131.02), and that a prior art specific example anticipates a range that includes the example (MPEP 2131.03). However, the claimed non-constant function f(rcFactor) in claims 9 and 23 is not the constant described in Satoh et al.

Haskell et al., in combination with Noh et al., discloses the claimed invention except for details of measuring data complexity. Satoh et al. teaches that it was known to measure video frame complexity according to both the number of coded bits per frame and the quantization scale for a frame. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to generate a picture complexity measure according to specific picture details as taught by Satoh et al., since Satoh et al. states in paragraph [0025] that such a modification would be useful to generate an accurate calculation for the number of bits to allocate to a transcoded frame.

Regarding independent claim 26, figure 1 of Haskell et al. shows decoder 104, DCT coefficient processor 107, encoder 109, and controller 113, and regarding independent claim 27, these components are considered equivalent to those shown in figure 1 and described in the specification of the present invention, and so fall within the limitations implied by 35 U.S.C. 112, sixth paragraph, according to the means-plus-function language of the claim. Regarding independent claim 28, the system of Haskell et al. may be implemented on a general-purpose microprocessor, a DSP, or a programmable video-processing chip (column 14: lines 24-30).

Regarding claims 2 and 14, in one embodiment of Haskell et al., the amount of data output is controlled by requantizing the DCT coefficients of a macroblock (column 10: lines 49-57).

Regarding claims 3 and 15, after processing one macroblock, the system of Haskell et al. updates the buffer status and the control signal controlling the adjustment to the amount of data to be output (column 9: lines 42-65).

Regarding claims 4 and 16, after processing a macroblock, Haskell et al. checks to see if a frame is finished, and if it is, updates frame parameters (column 10: lines 4-8).

Regarding claims 5 and 17, after processing each frame, Haskell et al. recalculates the number of bits per frame, target bits for the next frame, and the control signal (column 10: lines 8-22).

Regarding claim 6, in one embodiment of Haskell et al., the difference between targeted bits per macroblock and actual bits per macroblock determines the number of DCT indices to be retained and the number to be suppressed to zero (column 9: line 60–column 10: line 3).

Regarding claim 7, in Haskell, the values of DCT coefficients are directly proportional to the quantization parameter. Therefore, by adjusting the quantization parameter, coefficient values are inherently adjusted. Additionally, in Satoh et al., global complexity measure X for a frame is determined according to S, the number of coded bits in a picture (paragraph 0021). Since MPEG-2 and MPEG-4 use variable-length coding techniques in which larger DCT coefficients take more bits than small coefficients, a high number of bits per picture may indicate a high number of DCT coefficients or large values thereof.

Regarding claim 8, in one embodiment of Haskell et al., the difference between targeted bits per macroblock and actual bits per macroblock determines the size of the DCT quantization parameter (column 11: lines 56-63). Additionally, in Satoh et al., global complexity measure X is also dependent on Q, the average quantization scale code for the frame (paragraphs 0021-0022).

Regarding claim 20, Haskell et al. preferably operates on H.261 video, which encodes macroblocks with the Discrete Cosine Transform, or DCT (column 4: lines 27–29).

Regarding claims 21 and 22, H.261 coding was known to encode each macroblock with six DCT blocks, including four luma blocks and two chroma blocks

(column 7: line 62–column 8: line 22). Since claim 21 does not state that determining spatial activity is performed "only" among luma blocks, a determination of spatial activity according to both H.261 luma and chroma blocks is within the scope of both claims 21 and 22.

Allowable Subject Matter

8. Claims 9–13 and 23–25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: Claims 9 and 23 are directed to a function of determining normalized spatial activity value dependent on a non-constant function f(rcFactor) of a ratio of actual bit count to target bit count. Satoh et al., as well as other prior art documents, disclose a similar function of normalized spatial activity value, but are not dependent on the claimed non-constant f(rcFactor) function, instead each using a constant value in its place, usually 2. Then, claims 9 and 23, and their dependent claims, which include the additional non-constant adjustment factor to improve image quality adaptively, are considered novel and non-obvious.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 5,539,663 A (Agarwal), U.S. Patent 5,610,659 A

(Maturi et al.), U.S. Patent 6,072,831 A (Chen), U.S. Patent 6,084,909 A (Chiang et al.), and U.S. Patent 6,480,539 B1 (Ramaswamy) each disclose the normalization formula found in Satoh et al.

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David N. Werner whose telephone number is (571)272-9662. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571) 272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. N. W./
Examiner, Art Unit 2621

/Mehrdad Dastouri/
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